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PETROLOGICAL ABSTRACTS AND REVIEWS

ALBERT JOHANNSEN

MILLER, WILLIAM J. "Geology of the Blue Mountain, New York, Quadrangle," *Bull. 192, N. Y. State Mus.*, 1916 (1917). Pp. 68, map 1, pls. 11, fig. 1.

The Blue Mountain Quadrangle in the Adirondack region lies in northern Hamilton County, N. Y. From oldest to youngest, the formations are: the Grenville series, limestones, and quartzites, followed by two small intrusions of anorthosite. The most widespread rocks of the region are syenite and granite with basic phases which are intrusive into both the Grenville series and the anorthosite. Following this came gabbro, still later pegmatite and a few dikes of diabase. Glacial and postglacial deposits complete the series. The rocks of the Grenville series are thought to be sedimentary. Twelve quartz-syenites are described, three of which are said to be "practically monzonites." The quartz ranges from 12 to 20 per cent, consequently the reviewer would prefer not to call them quartz-syenites, which name he would limit to syenites with less than 5 per cent quartz, but granites. In the reviewer's system ten of these rocks are classed in 226′, granites (or in limited sense monzo-granites), the remaining two are 226″ or quartz-monzonites. The basic phases of the syenite are 228, 328, 227″, 2212, 3211′, tonalites, quartz-monzonite, diorite, and monzo-diorite. Of fifteen granitic-syenites and granites, thirteen are 226′ (granites), one 126′ (a leuco-granite), and one near Daly's Moyie sill rock, at the intersection of Families 1, 2, 5, and 6′, in Class 2, Order 2. Of six "typical gabbros," one (No. 17) is a garnet-bearing melagabbro, and one (No. 52) is a garnet-bearing norite. The other four are said to contain oligoclase-labradorite and andesine-labradorite which, without further descriptions of the feldspars, prevents their classification.

MILLER, WILLIAM J. "Adirondack Anorthosite," *Bull. Geol. Soc. Amer.*, XXIX (1918), 399–462, figs. 3.

Miller takes exception to Bowen's statement (*Jour. Geol.*, XXV [1917], 242) that "Anorthosites are made up almost exclusively of the single mineral plagioclase." Bowen's statement is and is not true, depending upon whether the rock anorthosite or the anorthosite formation is meant. Hunt's original definition applied to a whole series of rocks which are "composed chiefly of a lime-soda feldspar, varying in composition from andesine to anorthite, and associated with pyroxene or hypersthene. This rock we shall distinguish by the name of anorthosite. . . . . In some cases the . . . . dark mineral is entirely wanting." (*Geol. Canada*, 1863, 22.) According to modern petrographic usage the term anorthosite has come to mean a basic-feldspar rock, which is practically free from dark minerals, say with less than 5 per cent, yet the Canadian anorthosites are spoken of in the sense of Hunt. Bowen, therefore, if he speaks of the whole formation, is incorrect when he says that "Anorthosites are made up almost exclusively of the single mineral plagioclase," for as Miller shows, the dark mineral averages 10 per cent. He says, "The main bulk . . . . contains 5 to 10 per cent of minerals other than plagioclase . . . . in many places there are 10 to 20 per cent, or even more of dark mineral. It is also true that some portions of the mass contain less than 5 per cent of dark minerals. . . . . Conservatively estimated, I believe the average . . . . anorthosite carries fully 10 per cent of minerals other than plagioclase." Attacking Bowen's theory that the anorthosite may not have been at one time in a molten condition, Miller says: "The Adirondack anorthosite would have formed a melt of notably more complicated composition than the artificial melt with 10 per cent diopside and [it would have been formed] under deep-seated geologic conditions. Is it safe to say, therefore, that such a melt may not have been a true magma with a high percentage of liquid? . . . . Another important consideration is the almost certain presence of very appreciative amounts of dissolved vapors, particularly water vapor, in the magma. . . . . Also the presence of about 2 per cent iron oxide in the typical anorthosite should not be overlooked. . . . . All things considered, therefore, I not only think it very reasonable to apply the mutual solution theory to the anorthosite, but also to regard the anorthosite to have existed in magmatic condition at a moderate temperature." He says further: "I consider the main steps in the development of the anorthosite to have been as follows: First, intrusion of a laccolithic body of gabbroid magma . . . . second, relatively rapid cooling of the marginal portion to give rise to the chilled gabbroid border phase; and, third, settling of many of the slowly crystallizing femic minerals in the still molten interior portion of the laccolith, leaving a great body of magma to gradually crystallize into anorthosite. Thus, at the bottom, and probably nowhere visible in the field, lies a mass of pyroxenite or peridotite . . . . " (p. 457).

Miller says in reference to a syenite (p. 438), "Labradorite and andesine are always present and oligoclase usually." The reviewer must again make the statement which he has made a number of times before, that he doubts whether in rocks which are composed of crystals of a single generation, two different plagioclases can occur together except as zonal growth.

It is impossible in this abstract to give all of Miller's conclusions. Briefly they are:

The Adirondack anorthosite is a great laccolithic intrusive body—older than the accompanying granite-syenite series. The average rock contains fully 10 per cent of dark minerals, and is differentiated practically *in situ* from an intruded gabbroid magma, developing a chilled gabbroid border facies and an upper zone of anorthosite from a magma which was to a very considerable degree at least, actually molten. The anorthosite-gabbro and gabbro associated with the anorthosite represent local differentiates. Syenite and granite are not differentiates from the anorthosite, although transition rocks (Keene gneiss) were produced locally by magmatic assimilation of still hot, but not molten, anorthosite by the syenite or granite magma.

MILLER, WILLIAM J. "Geology of the Schroon Lake Quadrangle," *Bull. 213, 214, N. Y. State Mus.*, 1918 (1919). Pp. 102, map 1, pls. 14, figs. 9.

The Schroon Lake quadrangle represents an area of about 215 square miles in the central eastern portion of the Adirondack mountain region. The oldest rocks are those of the Grenville series which were intruded by a relatively stiff gabbroid magma which differentiated and formed the anorthosite. The intrusion of the anorthosite lifted the Grenville strata but also engulfed fragments of it. Following this came the intrusion of the syenite-granite series which partially domed, partially broke and tilled, the Grenville. The metamorphism of the Grenville took place probably before or during the period of igneous activity. During the succeeding period of uplift there was great erosion and some igneous activity indicated by the intrusion of certain diabase dikes. In late Cambrian time a gradual submergence took place with deposition of sandstones and dolomites. A long period of erosion from Ordovician to late in the Mesozoic reduced the land to a peneplain rising to moderate heights above the general level, and this was followed by uplift and active erosion, which continues to the present time. During the Ice Age the entire area was covered by the ice sheet. Toward its close there was a subsidence of several hundred feet below the present level, and finally a differential uplift with greater elevation at the north.

MILLER, WILLIAM J. "Banded Structures of the Adirondack Syenite-Granite Series," *Science*, XLVIII (1918), 560–63.

Both assimilation and differentiation contributed to the banding.

MILLER, WILLIAM J. "Silexite: A New Rock Name," *Science*, XLIX (1919), 149.

The name silexite is proposed for any body of pure or nearly pure silica of igneous or aqueo-igneous origin which occurs as a dike, segregation mass, or inclusion within or without its parent rock. (See also "Pegmatite, Silexite, and Aplite of Northern New York," *Jour. Geol.*, XXVII [1919], 28–54.)

MOORE, E. S. "'Pele's Tears' and Their Bearing on the Origin of Australites," *Bull. Geol. Soc. Amer.*, XXVII (1916), 51–55.

Australites are thought to be of volcanic origin since bodies of distinctly volcanic origin show that similar forms can originate in the atmosphere from rotating liquid bodies.

MOORE, RAYMOND C. "The Relation of the Buried Granite in Kansas to Oil Production, *Bull. Amer. Assoc. Petroleum Geol.*, IV (1920), 255–61.

This paper is petrographically of interest from the short description of a buried ridge of granite extending as an elongated mass from north of the Nebraska state line into Kay County, Oklahoma. The ridge reaches its highest elevation near the north boundary line of Kansas in Nemaha County, where it is less than 500 feet below the surface. It descends gradually to the south and forms a saddle in northwestern Wabaunsee County, then rises in Morris and Chase counties in underground peaks of different elevations.

O'HARRA, CLEOPHAS C. "A Bibliography of the Geology and Mining Interests of the Black Hills Region," *South Dakota School of Mines Bull.*, XI, 1917. Pp. 216–17, map 1.

A very important and useful bibliography of the Black Hills, containing not only titles and references, but abstracts of each of the 1,187 items listed.

OSANN, A. "Der chemische Faktor in einer natürlichen Klassifikation der Eruptivgesteine, I." *Abhandl. d. Heidelberger Akad. d. Wiss., Math.-naturw. Kl.*, Abh. 8, 1919. Pp. 126, pls. 5.

This is another important contribution to the chemical classification of rocks, and one which will be welcomed by everyone who uses Osann's system. In former publications the determination of the s, A, C, F, a, c, and f values, and their plotting in triangular diagrams ended the attempt at classification. Here regular pigeonholes are established, so that it is a very simple matter to locate analyses of similar rocks. The first 23 pages of this work are devoted principally to general discussions and various modifications of the previous methods of calculation. It is to be regretted that nowhere is there given a definite set of revised rules for the computation of the formulae. The various modifications here proposed can be adopted by those already familar with the system, but a beginner will find it necessary to follow the discussion through many pages of print to obtain for himself a workable set of rules. It is true that the system has gradually developed, and various changes have been introduced, but it would seem that it is now in such form that well-defined rules could be given, and it is to be hoped that in the near future Professor Osann will publish such a set. From page 23 to the end various type rocks are calculated and the relations between their mineral composition and their position in the classification are discussed. The general divisions of the new groups are as follows:

	c=0–0.5	c=1–2	c=3–4	c=5–6	etc., etc.	c=13–14
a=30 –28						
a=27 –25						
a=24 –22						
etc., etc.						
a= 9 – 7						
a= 6 – 5						
a= 4 – 3						
a= 2 – 1						
a= 0.5– 0						

The values of *a* have intervals of 3 between 30 and 7, from 6 to 1 the interval is 2: the values of *c*, except the first, have intervals of 2.

The limiting values of the older rock types are:

Rock Type	Limiting Values			
	s	*a*	*k*	Percentage SiO_2
Granite and Quartz-diorite	82.5–69	26–27	1.8 –1.2	63
Syenite and Diorite	74 –57	24–23	1.1 –0.9	65–51
Essexite and Gabbro	60 –47	12– 0	0.9 –0.7	53–46
Mafic Essexite and Gabbro, Hornblendite and Pyroxenite	46 –42	2– 0	0.7 –0.6	44–42
Dunite, Peridotite, and basic Hornblendite	41 –36	2– 0	0.6.–0.5	40–35
Nephelite-syenite	67 –63	26–13	0.8 –0.7	59–54
Theralite and Shonkinite	53 –49	12– 5	0.65–0.5	46–43
Alkalic feldspar-free Rocks	58 –46	26– 3	0.86–0.39	50–39
Anorthosite	65 –50	11– 1.5	1.0 –0.9	57–44

The first three groups included the acid, neutral, and basic igneous rocks. According to Rosenbusch, the acid have 65 per cent, the neutral between 64 and 52 per cent, and the basic below 52 per cent of SiO_2. The fourth and fifth groups, with their extrusives are mafic, basic, and ultra basic differentiates of the third group. The sixth group is an alkalic side-group of the second, the seventh of the third. The eighth group includes rocks of very different mineralogical character and can be regarded only as a basic side-group of the sixth and seventh. The last group is connected with the second and third but belongs to the alkali series.

OSANN, A. "Der chemische Faktor in einer natürlichen Klassifikation der Eruptivgesteine, II," *Abhandl. d. Heidelberger Akad. d. Wiss., Math.-naturw. Kl.*, Abh. 9, 1920. Pp. 59.

In the first part, reviewed above, the plutonic rocks are discussed; in this the extrusives are considered. One hundred and fifty-one types, based on 973 analyses, are given, but owing to present conditions of publication, only the type rocks are shown, and the number of analyses falling in each group is indicated. The tabulation follows that given for the plutonites.

PATTON, HORACE B. "Geology and Ore Deposits of the Platoro-Summitville Mining District, Colorado," *Bull. 13. Colo. Geol. Surv.*, 1917. Pp. 122, maps 3, pls. 40.

The region here described lies between Creede, Alamosa, Chama, and Pagosa Springs. The rocks which occur are very similar to those described in the folios of the San Juan region. Short descriptions are given of rhyolite, latite (two chemical analyses), andesite (one analysis), basalt, monzonite (one analysis), quartz-monzonite-porphyry and diorite.

PETROGRAPHIC COMMITTEE. "Report on British Petrographic Nomenclature," *Mineralog. Mag.*, XIX (1921), 137–47.

A committee, consisting of Watts, Elsden, Flett, Teall, Thomas, Tyrrell, Evans, Hatch, Holmes, Prior, Rastall, and Smith, from the Geological Society of London and the Mineralogical Society, report on ninety rock-names and petrographic terms which have been used in more than one sense by British authors, and make recommendations as to those which are to be rejected and definitions of those to be retained. Some of the recommendations are in direct opposition to the recommendations by the Committee on Petrographic Terms of the U.S.G.S. in 1897 and 1898. For example the British committee recommend the use of the terms porphyry and porphyrite in the sense used in Germany, namely porphyry for rocks with dominant alkali-feldspar and porphyrite with dominant plagioclase. The U.S.G.S. recommended that "Porphyry and its derivatives are to be used as purely textural terms, without limitation to mineralogical groups. Porphyry will thus apply to all rocks, whatever their composition, containing phenocrysts in a distinct groundmass, and without regard to the size of the grains of the groundmass. Porphyrite is discarded as superfluous. . . . . " Further in regard to the use of the hyphen, the U.S.G.S. recommends that only similar terms be hyphenated, thus two mineral terms or two rock terms, as biotite-muscovite granite, granite-syenite, etc., but mineral and rock, or rock and texture, as unlike terms, are not united. The British committee say: "When a mineral-name, or names, and a rock-name are compounded to form a name of 'specific' signification, these should be joined by a hyphen; e.g. biotite-granite." With the usage of porphyry in the sense of the U.S.G.S., porphyritic rocks are defined as granite porphyry, diorite porphyry, etc., but the British committee says, "The name granite-porphyry is ambiguous, and should not be used." Why ambiguous is not clear, unless it is thought possible that it may be confused with porphyritic granite. But porphyritic granite and granite prophyry are quite different things. It is recommended that adamellite be discarded, or only used for acid members of the monzonite series, and monzonite is to be restricted to rocks of the type occurring in the Monzoni district. If monzonite is used in the original sense of de Lapparent for the Monzoni rocks, it is a collective name and embraces monzonites Brögger, gabbros, and pyroxenites. Personally the reviewer would like to see the intermediate rocks, monzonite and adamellite, dropped (see *Jour. Geol.*, XXVII [1919], 38, and XXVIII [1920], 229), and the term granodiorite returned to its original sense (*Jour. Geol.*, XXVII [1919] 168). The latter recommendation is also made by the British committee. The usage of the term panidiomorphic by the British committee (following Rosenbusch) as given in the definition of aplite, is regarded by the reviewer as incorrect. A panidiomorphic rock would be one in which all of the constituents have their own crystal boundaries. Such a rock is almost inconceivable: and the texture of aplite is as far removed from this as it can possibly be, for it has a saccharoidal texture, that is, one in which all of the constituents are xenomorphic (allotriomorphic); it is, consequently, panxenomorphic or panallotriomorphic. The British committee recommend the terms allotriomorphic and idiomorphic in preference to xenomorphic and automorphic. The latter, however, have priority by one year. The term essexite "is retained for rocks practically identical with, or which show but slight divergence from, the original type of Salem Neck, Essex Co., Massachusetts," which is a large order since the original locality shows such a divergence of type. It is recommended that diabase be dropped and dolerite used. One is as bad as the other. Diorite and gabbro are given the meanings accepted in the United States (namely separated on the basis of the feldspar), and Harker's usage is not followed. Leuco- as a prefix for leucite, as used by Lacroix, is put in the discard. The less exact terms basic, intermediate, and acid are used in preference to subsilicic, mediosilicic, and persilicic of Clarke.

POWERS, SIDNEY. *A Lava Tube at Kilauea.* Private Publication. Pp. 7, pls. 5.

Describes a lava tube, extending from the Kaluaiki pit crater in a northeasterly direction for 1,494 feet with a drop of 73 feet. The maximum height is 20 feet, the maximum width 22 feet. In the roof of the tube there are more than a dozen small, conical cupolas "blow-piped" by gas escaping from the lava. These cupolas vary from 1 to 8 feet in height and with similar basal diameters. Thirty-three cross-sections, drawn to scale, are given.

POWERS, SIDNEY. "Volcanic Domes in the Pacific," *Amer. Jour. Sci.*, XLII (1916), 261–74, figs. 5.

Gives data on various volcanic domes, showing size, composition, and important features. Viscosity is the principal factor which determines whether the magma shall appear as a flow or dome. In some cases a flow comes first, then a dome; in others the dome comes first and the lava later breaks through the crust.

POWERS, SIDNEY. "Granite in Kansas," *Amer. Jour. Sci.*, XLIV (1917), 146–50.

An earlier report on the granite ridge mentioned above (Moore, Ramond C., *Bull. Amer. Asso. Petro. Geol.*, IV, 1920).

QUENSEL, PERCY. "De kristallina Sevebergarternas geologiska och petrografiska ställning inom Kebnekaiseområdet," *Geol. Fören. Förhandl.*, XLI (1919), 19–52, figs. 15, pls. 2, profile 1.

Describes the crystalline schists from Kebnekaise, in Lapland. An analysis of a feldspar-rich "gneiss-mica-schist" is given.

QUENSEL, PERCY. "Zur Kenntnis der Mylonitbildung, erläutert an Material aus dem Kebnekaisegebiet," *Bull. Geol. Inst. Upsala*, XV (1916), 91–116, pls. 4.

The mylonites from Kebnakaise are regarded as primarily derived from igneous rocks, though some sediments may occur among them.

QUENSEL, PERCY. "Über ein Vorkommen von Rhombenporphyren in dem präkambrischen Grundgebirge des Kebnekaisegebietes," *Bull. Geol. Inst. Upsala*, XVI (1918), 1–14, pl. 1.

Describes a rhombic porphyry in which the feldspar is a microcline antiperthite ($Or_1Ab_9An_2$). It is microperthitic and zonal, with a central portion of plagioclase surrounded by pink potash feldspar or white albite. The change from center outward is not gradual, but abrupt, and seems to indicate a sudden change in the chemical character of the magma.

QUIRKE, TERENCE T. "Espanola District, Ontario," *Mem.* 102, *Canadian Geol. Surv.*, 1917. Pp. 92, map 1, pls. 6, figs. 8.

The Espanola district is 43 miles west of Sudbury, and comprises an area of 116 square miles. The rock formations are principally Huronian, with older metamorphosed sedimentary schists and slates, and intrusive greenstones and granite. The Huronian rocks are cut by diabase dikes and sills, more or less contemporaneous with the faulting of the region. Pleistocene formations lie directly upon the Pre-Cambrian, and consist of fluvioglacial deposits, till, clays, and lake sands.

QUIRKE, TERENCE T., and FINKELSTEIN, LEO. "Measurements of the Radioactivity of Meteorites," *Amer. Jour. Sci.*, XLIV (1917), 237–42.

Gives the radium content of twenty-two meteorites not previously determined. It is found that the average stony meteorite is considerably less radioactive than the average igneous rock, probably less than one-fourth that of an average granite, and that the metallic meteorites are almost free from radioactivity.

REINHEIMER, SIEGFRIED. *Der Diorit vom Buch bei Lindenfels im Odenwald mit einem Anhang über einige mikroskopische Methoden.* Inaug. Dissert., Heidelberg, 1920. Pp. 63, Figs. 8, Photo. Pl. 3.

Two "diorites" and a gabbro are described. No modal percentages are given, but in general it may be said that the main rock from the Buch consists of more amphibole than plagioclase with accessory biotite and a little quartz. The plagioclase is zonal with cores $Ab_{12}An_{88}$ and outer zones Ab_{40-46} An_{60-54}. There is a pale to colorless amphibole and one that is green, the latter usually surrounding the former. The author says a "gabbro tendency" is shown, and that diallage is proxied by an amphibole of similar chemical composition. The second rock, from Kreuzer's quarry, near Winterkasten, is similar, although generally the amphibole and plagioclase are in equal amounts. The feldspar is approximately $Ab_{17}An_{83}$, biotite is rare, and quartz is wanting. The third rock from near Laudenau differs from the other two. It is described as a gabbro of the type of the Scandinavian hyperites. The dark minerals consist of green amphibole poikilitically intergrown with plagioclase, and diallage and olivine. The plagioclase is Ab_9An_{91}. Since the plagioclase in all of the rocks is labradorite to bytownite, the reviewer would call all the rocks gabbro (amphibole gabbro) in spite of the statement of the author that the magma must have been poor in lime. (No chemical analyses are given.)

Associated with these rocks are certain diaschistic rocks, among them diorite-pegmatite, schlieren of "needle-diorite," and beerbachite.

In the Appendix the determination of refractive indices in cleavage fragments of amphibole by the immersion method, and the determination of 2V with the Federow stage are discussed.

RICHARDS, H. C. "The Building Stones of Queensland," *Proc. Roy. Soc. Queensland*, XXX (1918), 97–157, pls. 3, figs. 10.

The physical, chemical, and mineralogical characters of various available building stones, with their good and bad qualities, and a list of structures with the stones used, are given.

RICHARDS, H. C. "The Volcanic Rocks of Springsure, Central Queensland," *Proc. Roc. Soc. Queensland*, XXX (1918), 179–98, pl. 1, figs. 6.

The oldest rocks of this area are Paleozoic sediments, consisting of sandstones, gravels, and shales, and some limestone. The volcanic rocks, with a total thickness of 1,000 feet, are divided into three groups: a Lower Series which consists of basaltic agglomerate and basaltic flows, followed by trachyte tuffs and flows, then a return to basaltic flows. The Middle Volcanic Series consists of trachytic tuffs and flows which are "really phonolite in the strict petrological sense." In the weathered material, precious opal has been obtained. The Upper Volcanic Series consists of basaltic flows to a thickness of 600 feet. Three new chemical analyses are given. The upper and lower basalts are similar and closely comparable with the composition of the average basalt of the world. Richards says: "The basaltic rocks. . . . may represent outpourings of a comparatively undifferentiated primary basaltic magma. . . . . Gravitative differentiation may have gone on to some extent as the lower series is olivine free, while the upper series is rich in olivine (fayalite). . . . The intruded terrane almost certainly contains limestone, and the solution of this material to a small extent would be regarded by Daly as sufficient to result in the production of the phonolitic material from the calcic basic magma. . . . . The writer, however, in dealing with the origin of the volcanic rocks of south-eastern Queensland, regarded them as being differentiates of a single original magma."

RICHARDSON, W. ALFRED. "The Marginal Features of a Basic Dyke at Peldar Tor, Charnwood Forest," *Geol. Mag.*, LVIII (1921), 170–77.

A much altered greenstone (dolerite) dike which intrudes dacite shows a chilled marginal phase and a crystalline center. At the contact the margins are laminated, resembling columnar basalt, but actually consist of alternating sheets of country rock and dike. Three possible explanations for the lamination are given.

RICHARDSON, W. ALFRED. "A Method of Constructing Rock-Analysis Diagrams on a Statistical Basis," *Mineralog. Mag.*, XIX (1921), 130–36.

Diagrams for plotting the chemical analysis of a rock are given.

RICHARDSON, W. ALFRED. "A New Model Rotating-Stage Petrological Microscope." *Mineralog. Mag.*, XIX (1920), 96–98.

Describes a new Swift petrographic microscope.

RICHARZ, STEPHAN. "Die Basalte der Oberpfalz," *Zeitschr. d. deutsch. geol. Gesell.*, LXXII (1920), 1–100. Pl. 2, Figs. 8.

The basalts of the Oberpfalz are very similar megascopically, but under the miscroscope three types are recognized; pure nephelite-basalts, pure feldspar-basalts, and nephelite-bearing feldspar-basalts. No melilite-basalts were found although they occur at Steinberg near Hohenberg in Oberfranken. Some of the basalts are rich in both endogenic and exogenic inclusions, others rarely contain any. Among the inclusions are olivinefels, pyroxenites, fritted sandstones, and basalt-jaspis. In addition to the usual minerals, labradorite, nephelite, augite, olivine, magnetite, some glass, there occurs in some of these rocks, biotite. In the inclusions aegirite, katophorite, sanidine, oligoclase-andesine, quartz, and the recrystallization minerals, natrolite, phillipsite, calcite, aragonite, opal, and a new mineral called magnalite, occur. Field observations show that the basalt occurs in the form of dikes much more commonly than previously thought. The width varies from 50 to 200 meters.

RINNE, F. *Gesteinskunde.* Leipzig, 1921. 6th and 7th (double) ed., 8vo. Pp. 365, Figs. 510.

It is almost impossible in a short review to do justice to a general textbook which does not aim to present any startling new theories. One can do little more than give a summary of the table of contents. The first 120 pages of this book, which is not only a petrography but a petrology, are devoted to general geological modes of occurrence of igneous rocks, sediments, and crystalline schists, jointing, parting, and other structures, petrographic methods, and the mineral constituents of the rocks. The final 235 pages are devoted to descriptive petrography of igneous, metamorphic, and sedimentary rocks. As an introduction to the igneous rocks there are thirty-eight pages devoted to their chemical composition and modes of expressing these graphically, differentiation, gases in magmas, sequence of crystallization with many diagrams, and textures and structures. Following the general descriptions of the igneous rocks are a few pages on meteorites. Introducing the sedimentaries are sections on origin, weathering, transportation, deposition, and diagenesis. Among the descriptions of the sediments, that on salt deposits is especially detailed, occupying sixteen pages. The crystalline schists are preceded by chapters on origin and textures. The book is profusely illustrated with photographs, undoubtedly excellent in the originals, but not well reproduced. The book may well serve as a text for students who have a sufficient command of German.

ROSENBUSCH-WÜLFING. *Mikroskopische Physiographie der Mineralien und Gesteine. Bd. I. Die petrographisch wichtigen Mineralien. Pt. I. Untersuchungsmethoden.* 5th ed., Stuttgart, 1921. Pp. 252, Figs. 192, and a colored plate.

This well-known work again has been revised, enlarged, and practically rewritten by Wülfing, so that it bears very little resemblance to the third edition of Rosenbusch. The present instalment of the book, which is the first half of the first part, all so far published, deals with methods of preparation, and with general theories of optics. Much new material has been added, and some of the old has been omitted to keep the size of the book within reasonable bounds, but how much has been omitted it is impossible to determine, in many cases, on account of the rearrangement and the appearance of only the first part as yet.

Following the Introduction, which is somewhat condensed, there is a section on preparation methods. The history of microscopical research, the description of stereographic projection, and the graphical methods and formulas, which followed in the fourth edition, are entirely omitted. Thirty-five pages on the preparation of thin sections come next, instead of being inserted between the chapters on optical principles and optical instruments, a decided improvement in arrangement. Here are given a number of new devices for cutting, grinding, and polishing. The cutting of oriented sections is described in considerable detail, occupying with the instructions for cutting plane surfaces and polishing, some fifteen pages.

Optical methods are introduced by a general discussion of theories of light. In the preceding edition, following the discussion of the indicatrices, the Fresnel ellipsoid, and uniaxial and biaxial ray and wave surfaces, came a section on lenses, microscopes, and various accessories. In the present edition this is omitted, probably to come later, and the discussion of optical phenomena continues unbroken. The same arrangement holds throughout the book. All of the theoretical material is brought together and the determinative methods are omitted, undoubtedly to be collected in the second half. This makes the different parts of the book much more unified and gives a better appearance, but will it be so easy for the student?

After a discussion of interference phenomena there is a new section on the dispersion of birefringence and the departure of the interference colors of crystals from the pure colors of Newton's scale. Section 46, on the movement of light, has been entirely rewritten, and the figures have been redrawn. The material in this portion of the work has been so radically rearranged that it is difficult to compare it with the old edition, especially since some of the material may have been transferred to the future second part.

In the preceding edition, following the theoretical discussion of the intensity of transmitted light, came a chapter on the practical methods of determining extinction angles. In the new edition this is omitted, apparently to be given later, and the theoretical part is followed by an explanation of the phenomena in convergent light, and there are given the formulas for isochromatic curves, isogyres, and so on. The steps in obtaining Neumann's formula for calculating the values of birefringence in any section have been increased from a half to four pages, a very considerable help to the student who cannot refer to the original article. The section on interference figures also has been much extended, the explanation of the cross and rings obtained in uniaxial crystals alone having been increased from four and one-half to nine and one-half pages. Becke's skiodromes are given in illustration of both uniaxial and biaxial figures. Under dispersion the old cuts have been discarded and new and much better drawings, as well as photographs showing dispersion, have been inserted. The subject of pleochroism has been extended from twelve to sixteen pages, and a new section of two pages on luminescence has been added.

Polarizing prisms, which formerly came before the discussion of microscopes, and before the discussion of interference, pleochroism, etc., now comes near the end of the first half and takes up twenty-one pages. Finally, there is the concluding section on Monochromatic Light, increased from six to fourteen pages. Here are now given liquid color filters, more material on monochromatic flames and the monochromator, and a new description of the mercury lamp.

The book is now, as it has always been in the past, the one big indispensable work which begins where others end. Author and publisher are to be congratulated on its appearance. Press work, paper, and illustrations are excellent and, in spite of the difficulty of obtaining good paper, are fully up to the standard of previous editions.

SCHEURING, GEORG. "Die mineralogische Zusammensetzung der deutsch-südwest-afrikanischen Diamantsande," *Beiträge z. Geol. Erforsch. d. Deutschen Schutzgebiete*, Hf. I, 1914. Pp. 49, map 1, fig. 1.

Describes the minerals associated with the diamond in German Southwest Africa. Of petrographic interest from the description of a separating apparatus which might possibly be applied to the preliminary separation of rock constituents.

SCHLOSSMACHER, K. "Zur Erklärung der Becke'schen Linie," *Centralbl. f. Min. Geol.*, etc. (1914), 75–79, figs. 2.

A theoretical discussion of the Becke line. The writer shows that with vertical contacts the phenomenon is to be explained by Snell's law; with inclined contacts between minerals the effects are more complex, and may be accounted for in part by the explanation given by Grabham.